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Specification and Drawings, as originally filed, with Application for Patent Serial No:  
2,432,458, on June 16, 2003, by WILLI HENKENHAF, for "Water Wheel Generator Pair".

**PRIORITY DOCUMENT**  
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## ABSTRACT

The invention is a pair of co-rotating water wheel and generator pairs each rotating about a single vertical axis. Each wheel/generator is mounted on a respective axle one of which is solid and the other tubular. Separation of water flow into 2 streams engages the wheels for rotation in opposite directions. Folding paddles collapse and extend to engage the moving water.

## WATER WHEEL GENERATOR PAIR

### DESCRIPTION

#### BACKGROUND

5 Water wheels have been known for many years and are often combined in multiple units to increase available power. When connected to an electrical generator hydro-electric power is produced. Wheels may have fixed or movable paddles each of which interact with a moving flow of water in turn to provide the source of work. Movable paddles typically  
10 enhance the work available from the moving stream by confining water and wheel interaction for desirable rotation.

#### PRESENT INVENTION

The present invention seeks to overcome disadvantages of multiple unit water wheels as known in the prior art in a manner both economical and  
15 susceptible to long service life.

It is a further object of the invention to provide ready movability of the water wheel assembly and its major components and maintenance both on and off site, particularly off-site where maintenance may be economically conducted while substituted components continue the necessary  
20 functions.

It is a further object of the invention to provide relative high efficiency in resultant power generation and lower maintenance costs in an environmentally friendly manner with provision for passage of aquatic life and water-borne debris.

25 The present invention provides a balanced counter-rotating pair of wheel/generator pairs mounted for co-axial rotation.

## DRAWINGS

Figure 1 shows a cross-section of the preferred embodiment of the invention.

- 30 Figure 2 shows a cross-section of the 2-part moving water stream as it is presented to the Left Turning and Right Turning wheels of Figure 1.

Figures 3a and 3b show plan views of the Left Turning and Right Turning wheels.

- 35 Figure 4 shows a plan view of the preferred embodiment including a funnel entry.

Figure 5 shows a cross-section along line A-A of Figure 4.

Figure 6 shows a cross-section of a typical water wheel of the present invention with paddles extended.

## THE PREFERRED EMBODIMENT

- 40 The preferred embodiment shown in Figure 1 provides a base 1 typically constructed of concrete or like material resting on the bed of the body of moving water. The moving water has a nominal water level as at 8 in Figure 1. Preferably base 1 includes a main support bearing block 2 and suitable centering and alignment means 2a.

- 45 Tubular casement 3 is lowered on to the base 1 and axially aligned with block 2.

- Preferably, wheel/generator combination 4 is a single unit lowered into place co-axially with casement 3 so as to rest on bearing block 2 and with main co-axis 6 being generally vertical. Lifting eyes 7 are provided in  
50 wheel/generator 4 for ease of installation and removal. Alternatively, wheel/generator 4 may include bearing block 2 as a single unit. In this

configuration, means such as co-operating recesses (not shown) between base 1 and casement 2 provide for self-aligning co-axial installation.

Preferably casement 3 is provided with a recess 5 adapted to both support  
55 wheel/generator 4 and maintain co-axis 6 vertical over bearing block 2.

Right-turning (RT) water wheel 9 is fixed to solid central axle 10 as by welding or other means as at 11 in Figure 1. Rotational motion of the RT water wheel 9 is transmitted upwards by axle 10 and causes corresponding right turning motion of the right-turning (RT) generator  
60 armature 12 and production of electric power.

Left-turning (LT) water wheel 13 is fixed to tubular central axle 14 as by welding or other means as at 15 in Figure 1. Rotational motion of the LT water wheel 13 is transmitted upwards by tubular axle 14 and causes corresponding left turning motion of the left-turning (LT) generator  
65 armature 16 and production of electric power.

Vertical positioning of LT water wheel 13 is maintained by bearing block 35 affixed to solid axle 10.

Preferably solid axle 10 is also supported for vertical alignment by centering support 36.

70 Axles 14 and 10 are co-axial about co-axis 6 and provide that both the RT and the LT armatures 12 and 16 respectively provide work energy simultaneously to the generator portion 4.

As shown schematically in Figure 2 the casement 3 is provided with upper and lower water channels 17 and 18 respectively which  
75 individually direct water flow against the LT and RT water wheels 13 and 9 on either side of co-axis 6 for opposite rotation of the water wheels with a single flow of water.

Figures 3a and 3b show plan views of the preferred embodiment of the invention.

80 Figure 3a shows the RT (lower) water wheel 9 in plan view and its corresponding water flow 18a. Water flow 18a passes through and around water wheel 9 to cause rotation of the wheel 9 on vertical axle 10 about co-axis of rotation 6.

Figure 3b shows a plan view of the LT (upper) water wheel 13 and its  
85 corresponding water flow 17a. Wheel 13 is rotated counterclockwise by the movement in water flow 17a around tubular axle 14 about co-axis 6.

Each of the water wheels is constructed of a central disk 25 and a hub 26. A series of paddles 20 are each mounted to the disk 25 for rotation about a vertical axle 21 from a fully open water-engaging position 22 to a fully  
90 collapsed position 23. In the open position 22 the innermost end of paddle 20 abuts hub 26 and engages the corresponding wheel.

The LT and RT water wheels 13 and 9 are mirror images of each other in plan view in the preferred embodiment and can be constructed of essentially the same components for ease of manufacture, assembly and  
95 repair. Preferably each wheel has the same number of equally-spaced identical paddles 20 arranged with their forward positions, as at positions 27a and 27b respectively, in vertical alignment.

Preferably forward positions 27 correspond with the corresponding inner edges 28a and 28b of the water flows 17a and 17b respectively.

100 Significant spacing may be provided between casement inner wall 19 and the extremity of each paddle in either or both of the open and/or closed position as at 28 and 29 in Figure 3b.

The arrangement of co-axis 6 centrally located with the axles 10 and 14 along with the aligned forward positions 27a and 27b provides for a  
105 balanced and reduced stress configuration.

In an alternative preferred embodiment (not shown) the axles 10 and 14 may be geared together for corresponding and opposite rotation throughout service life. Such corresponding rotation would more exactly match and balance the stresses and vibrations associated with opening  
110 and closing of collapsing paddles 20 and more uniform development of electrical power.

Alternatively, the paddle opening and closing may be guided in association with both the position on the respective wheel and the rotational position of that wheel in the casement 3.

115 Additionally preferably, casement 3 may be provided with a funnel entry as at 31 in Figure 4. Co-operating converging vertical surfaces 32 and 33, each in 2 parts, a and b, act to increase the water speed and are adapted to separate water flows into entry streams 17a and 18a.

Figure 5 shows a cross-section of entry 31 taken along line A-A in Figure  
120 4. Surfaces 32a and 33a form a funnel for the upper water flow 17a while surfaces 32b and 33b correspondingly form the lower funnel for water flow 18a. As can be seen water flow 17a is confined and directed onto LT wheel 13 while flow 18a is directed onto RT wheel 9 through channels 17 and 18 respectively.

125 Figure 6 shows the preferred wheel arrangement in greater detail in connection with RT wheel 9 and with paddles on both sides fully extended so as to abut hub 26 at abutment 24.

It will be obvious to those skilled in the art that modifications may be made to the embodiments described above without departing from the scope of the present invention.

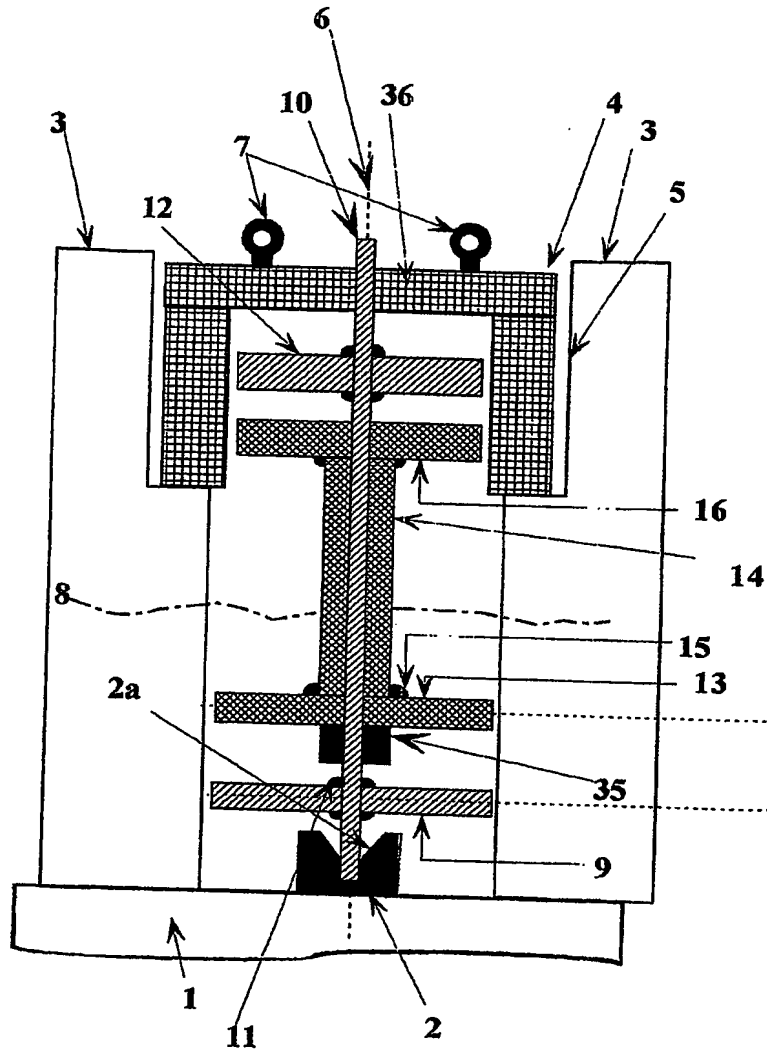
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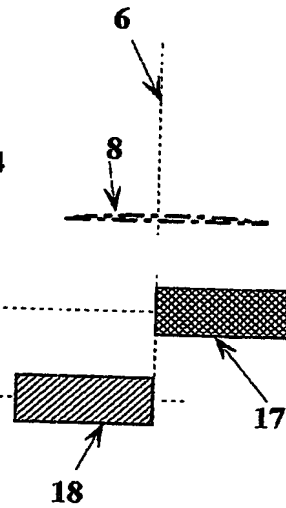
## CLAIMS

What I claim is:

- 5 1. A water wheel generator comprising:
  - a) A first water wheel and generator pair mounted on a first vertical axle for rotation about a vertical axis,
  - 10 b) A second water wheel and generator pair mounted on a second vertical axle for co-rotation with said first water wheel and generator pair about said first vertical axis,
  - c) Said second vertical axle adapted for rotation about said first vertical axle,
  - d) Said first and second water wheels mounted for immersion in a stream of moving water,
  - 15 e) Said first and second generators mounted above said moving stream of water.
2. A water wheel generator as claimed in claim 1 wherein each of said wheels further comprise a central hub and a plurality of paddles for engaging the said stream of moving water.
- 20 3. A water wheel generator as claimed in claim 2 wherein each of said paddles is mounted to said central hub for rotation about a paddle vertical axis from a closed to an open and water engaging position.



### Figure 1



### Figure 2

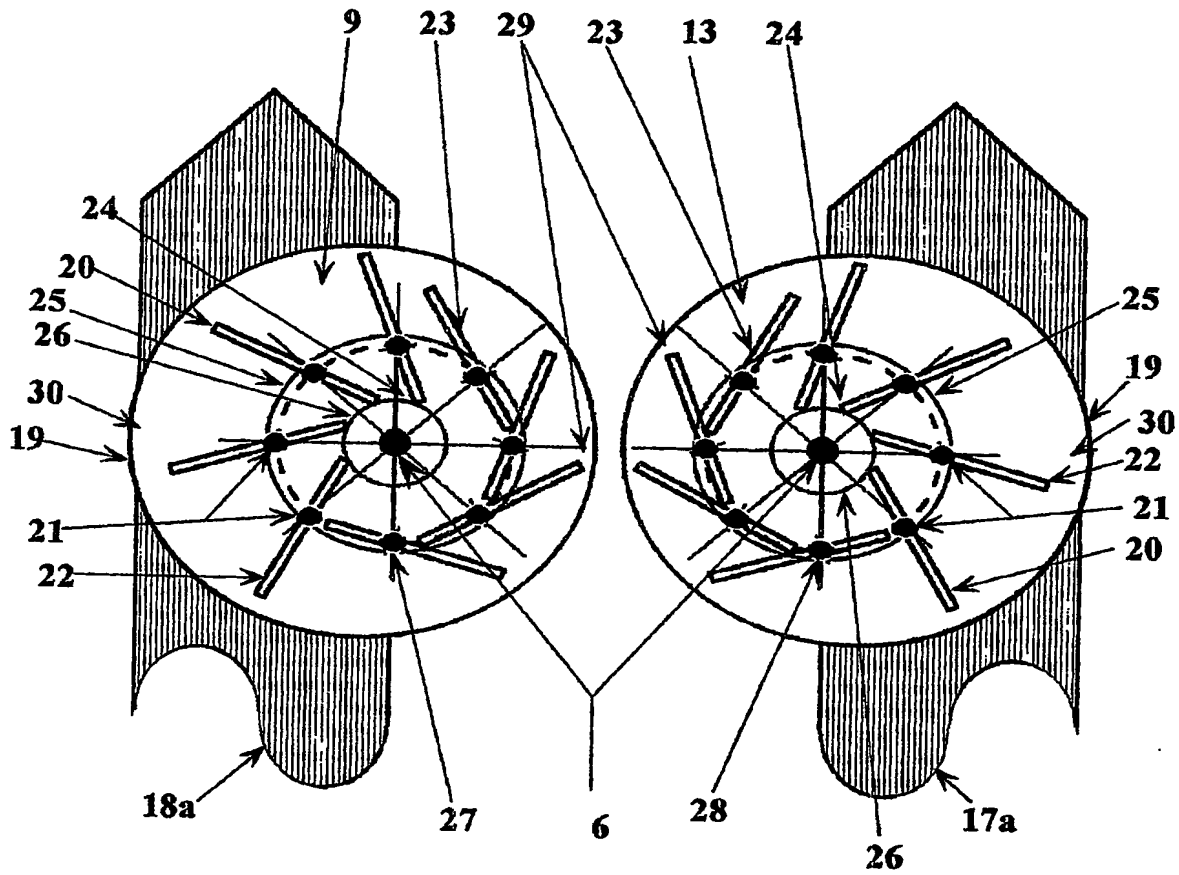
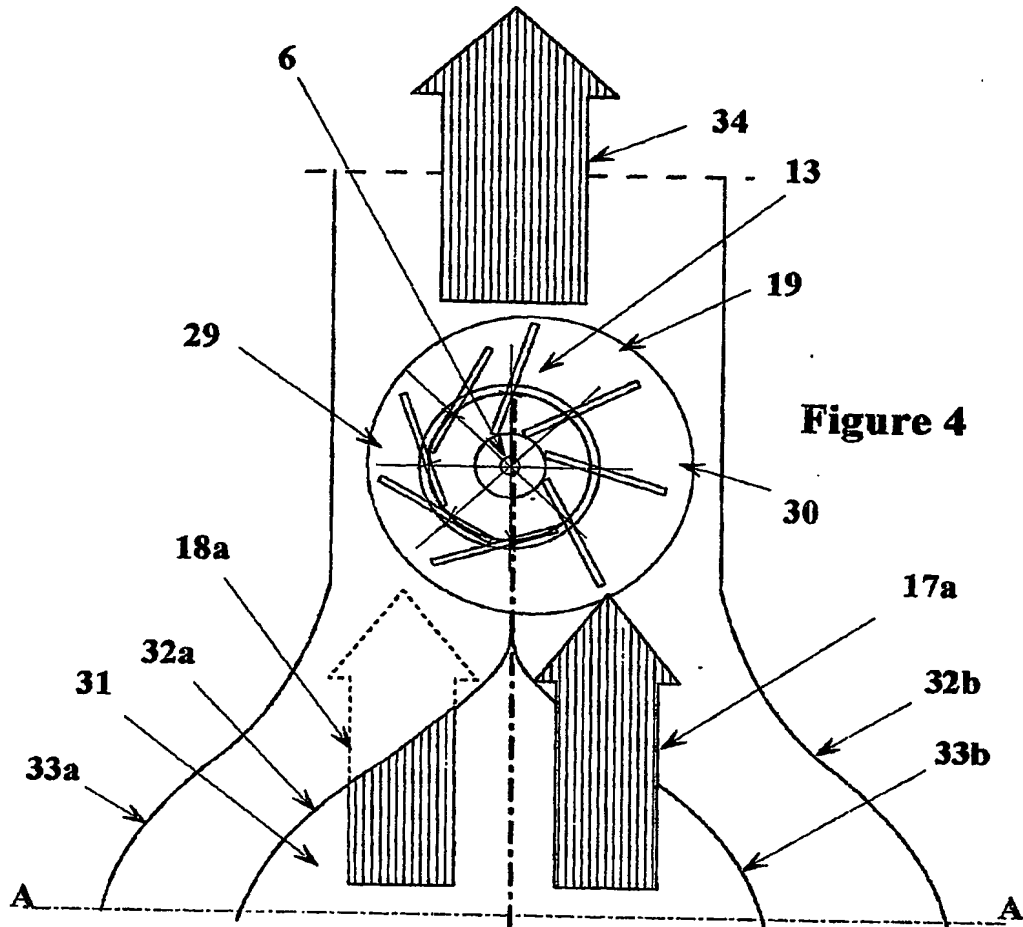
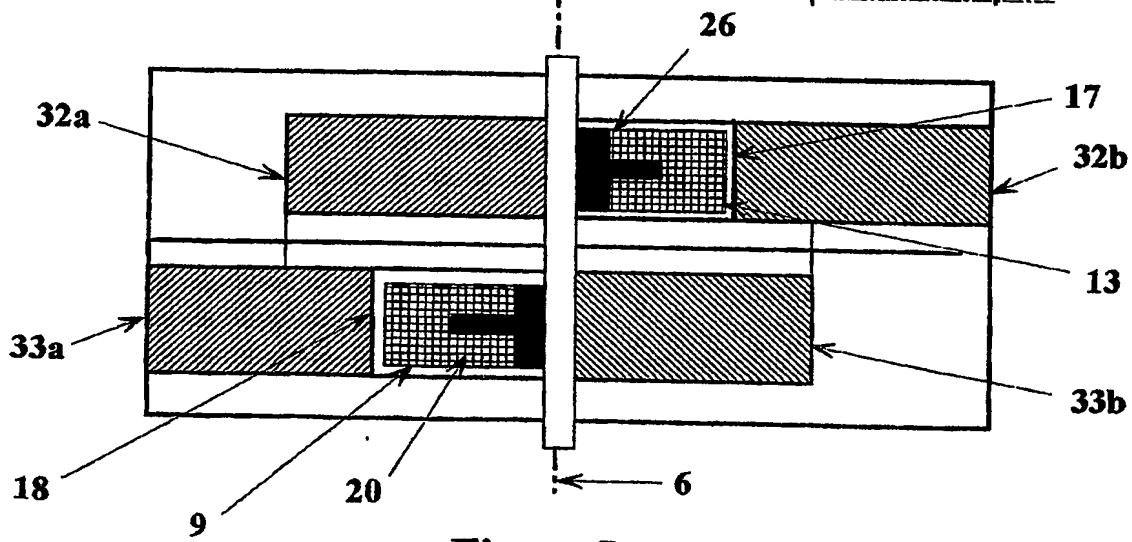


Figure 3a

Figure 3b



**Figure 4**



**Figure 5**

**Figure 6**

